IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of

Steven J. Harrington

Art Unit: 2676

Application No.: 10/039,299

Examiner: Rahmjoo, M.

Filed: January 2, 2002

Docket No.: A1096
XERZ 2 00436

For: A METHOD AND APPARATUS FOR FAST COMPUTATION OF ASSOCIATIVE OPERATIONS OVER FIXED SIZE REGIONS OF A DIGITAL IMAGE

MAIL STOP Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
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TRANSMITTAL OF
APPEAL BRIEF UNDER 37 C.F.R.§1.192

Dear Sir:

Applicant transmits herewith three (3) originally signed copies of APPEAL BRIEF UNDER 37 C.F.R.§1.192 for the above-reference patent application.

Payment in the amount of $500.00 for the filing of this Appeal Brief is authorized to be charged to Deposit Account No. 24-0037.

Respectfully submitted,

FAY, SHARPE, FAGAN,
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Sept 9, 2005
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I certify that this **Appeal Brief** Under 37 C.F.R. 1.136(a) and accompanying document(s) are being

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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

INVENTOR(S)	:	Steven J. Harrington
TITLE	:	**A METHOD AND APPARATUS FOR FAST COMPUTATION OF ASSOCIATIVE OPERATIONS OVER FIXED SIZE REGIONS OF A DIGITAL IMAGE**
APPLICATION NO.	:	10/039,299
FILED	:	January 2, 2002
CONFIRMATION NO.	:	8327
EXAMINER	:	Rahmjoo,Manucher
ART UNIT	:	2676
LAST OFFICE ACTION	:	September 13, 2004
ATTORNEY DOCKET NO.	:	A1096 XERZ 2 00436

RULE 37 C.F.R. §1.192 APPELLANT'S BRIEF

Mail Stop Appeal Brief – Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This Appeal Brief is in furtherance of the Notice of Appeal that was filed in this case on March 11, 2005.

The fees required under 37 C.F.R. §1.17 and any required petition for extension of time for filing this Brief and fees therefore are dealt with in the accompanying Transmittal of Appeal Brief.

Appellant files herewith an Appeal Brief in connection with the above-identified application wherein claims 1-21 were finally rejected in the final Office Action mailed September 13, 2004. What follows is Appellant's Appeal Brief (submitted in triplicate) in accordance with 37 C.F.R. §1.192(a).

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~~01 FC:1254 1500.00 OP~~

I. Real Party in Interest (37 C.F.R. §1.192(c)(1))

The real party in interest in the subject Appeal is Xerox Corporation of Stamford, Connecticut, the assignee of record for this patent application.

II. Related Appeals and Interferences (37 C.F.R. §1.192(c)(2))

There are no other applications involved in an appeal or interference before the U.S. Patent and Trademark Office from which the present application bases its priority, or any case which bases its priority upon the present application that will directly affect or will be directly affected by, or will have a bearing on the Board's decision in this Appeal.

III. Status of Claims (37 C.F.R. §1.192(c)(3))

The status of the claims set forth after the final Office Action mailed September 13, 2004 was and is as follows: allowed claims: **none**, rejected claims: **1-21**. The present Appeal is directed specifically to independent claims 1, 9 and 18 and dependent claims 2-8, 10-17, and 19-21.

IV. Status of the Amendments (37 C.F.R. §1.192(c)(4))

Amendments to the specification were made after the final Office Action of September 13, 2004. These amendments were submitted on September 9, 2005, in a paper separate from this Appeal Brief. These amendments include amendments to paragraphs [0003] and [0043] of the specification. These amendments more clearly place the application in condition for allowance, and do not necessitate a new search, do not add new matter and do not otherwise introduce new issues.

V. Summary of the Invention (37 C.F.R. §1.192(c)(5))

The present application is directed to a method and apparatus for fast computation of associative operations over fixed size regions of a digital image. The

fixed size regions, also referred to as windows, can include, but are not limited to, hexagonal, octagonal and rectangular regions.

The method and apparatus apply to a system 400, as shown in Figure 1, that is configured to accept an original document 402 that is scanned by scanner 404 and converted to a digital image. The digital image is then fed to image processing unit 406. The processing unit 406 is operatively associated with a storage module 408. The image processing unit 406 is also connected to print engine 410 which outputs a printed page 412.

As shown in Figure 2, the method 500 includes scanning an array to determine the pixel values in step 504. The array is then segmented into blocks, also referred to as tiles, of the pixel values in step 506. A desired associative operation is then performed on the pixel values of each block in step 508. These associative operations (op) have an associative quality in that (x op y) op z = x op (y op z) and they can include MAXIMUM, MINUMUM, AND and OR. Properties, or results of the operation, of each block are stored in a table in step 510.

A window defining a fixed size region of the image is then provided in step 512. The window has vertices and is configured such that a single vertex at most will be encompassed by any given block. Next, it is determined which portions of which blocks are within the window, or the fixed size region, in step 514. The appropriate property for each portion of each block within the fixed size region is then selected from the table in step 516 based on the step of determining of which portions of which blocks are within the fixed size region and the locations of the vertices of the window. To determine the property of the entire region encompassed by the window, the associative operation is performed on the selected properties, or results, to determine an overall property in step 518.

The method can also include a method for computing a property of a complex window for use in image analysis which includes dividing the complex window into regions, computing the property for each region to obtain a partial result by conducting an associative operation, and determining the property for the complex

window based on partial results of the regions by conducting the associative operation on the partial results.

The apparatus includes means for scanning the array to determine the pixel values, means for segmenting the array into blocks of the pixel values and means for performing an associative operation on the pixel values of each block to determine properties of each block and means for storing the properties of the each block. The apparatus also includes means for defining a fixed size region of the image, means for determining which portions of which blocks are within the fixed size region, means for selecting a property for each portion of each block within the fixed size region from the storing means, and means for performing the associative operation on the selected properties to determine an overall property for the fixed size region.

The method and apparatus may be applied to accommodate any window shape defining a fixed size region. It should be noted, however, that as claimed, only a single vertex, or corner, of the analysis window -- at most -- is positioned within a block of an image under analysis. In this way, the corner or vertex can be used to determine the property, or result, of an associative operation, for the portion of the block that is encompassed by the window.

VI. Issues (37 C.F.R. §1.192(c)(6))

Whether claims 1-6, 9-14, and 17-21 are unpatentable under 35 U.S.C. §102(e) as being anticipated by Naegle et al. (US Pub 2001/0033287), hereinafter Naegle.

Whether claims 7, 8, 15 and 16 are unpatentable under 35 U.S.C. § 103(a) over Naegle.

VII. Grouping of Claims (37 C.F.R. §1.192(c)(7))

The claims at issue do not stand or fall together. Specifically, claims 1, 9, and 18 each recite separately patentable subject matter.

Claims 1 recites a method for computing properties of an image represented by pixel values arranged in an array. The method comprises scanning the array to

determine the pixel values, segmenting the array into blocks of the pixel values, performing an associative operation on the pixel values of each block to determine properties of the each block, storing the properties of the each block in a table, providing a window defining a fixed size region of the image, the window having vertices and being configured such that a single vertex at most will be encompassed by any given block having portions within the fixed size region, determining which portions of which blocks are within the fixed size region, selecting a property for each portion of each block within the fixed size region from the table based on the determining of which portions of which blocks are within the fixed size region and locations of the vertices of the window, and performing the associative operation on the selected properties to determine an overall property for the fixed size region.

Claim 9 recites an apparatus for computing properties of an image represented by pixel values arranged in an array. Claim 9 uses means plus function language to define the characteristics of the apparatus claimed which necessitates one construing the meaning to the claim language to look to the specification. The apparatus comprises means for scanning the array to determine the pixel values, means for segmenting the array into blocks of the pixel values, means for performing an associative operation on the pixel values of each block to determine properties for the each block, means for storing the properties of the each block, means for defining a fixed size region of the image, means for determining which portions of which blocks are within the fixed size region, means for selecting a property for each portion of each block within the fixed size region from the storing means, and means for performing the associative operation on the selected properties to determine an overall property for the fixed size region.

Claim 18 is directed to a method for computing a property of a complex window for use in image analysis. The method comprises the steps of dividing the complex window into regions, computing the property for each region to obtain a partial result by conducting an associative operation, and determining the property for the complex window based on partial results of the regions by conducting the

associative operation on the partial results. Claim 18 does not include many of the limitations of claim 1 described above.

VIII. Arguments (37 C.F.R. §1.192(c)(8))

The Examiner rejected claims 1-6, 9-14, and 17-21 under 35 U.S.C. §102(e) as being anticipated by Naegle. The Examiner rejected claims 7, 8, 15 and 16 under 35 U.S.C. § 103(a) over Naegle. The appellant respectfully disagrees.

1. Summary of Arguments

The Naegle reference does not render unpatentable the subject matter recited in claims 1-21. Details of Appellant's arguments are provided in more detail below.

2. Appellant's Arguments Re: Claim 1

This application, and the embodiments as claimed therein, relates to the application of associative operations to fixed size regions of a digital image such as hexagonal, octagonal and rectangular regions. Claim 1 is patentable over Naegle, since Naegle does not teach or suggest performing an associative operation on pixel values of each block to determine properties of each block, as claimed. Further, Naegle does not teach or suggest performing an associative operation on the selected properties to determine the overall property of the region as claimed.

Webster's Third New International Dictionary, unabridged version, defines associative as "of, relating to, or being a mathematical operation that combines elements such that when the order of elements is preserved the result is independent of the grouping <addition is [associative] since (a + b) + c = a + (b + c)>". The specification defines an associative operation in paragraphs [0001] and [0043] as including MINIMUM, MAXIMUM, AND and OR operations. Further, commonly assigned, co-pending patent application (which issued as U.S. Patent No. 6,714,694), referred to hereinafter as the '694 patent, which was incorporated by reference in the specification in paragraph [0003], defines an associative operation as "having an associative quality, i.e., (x op y) op z = x op (y op z)". Applicant has

provided an amendment to the specification in another paper concurrently with this appeal brief which adds this statement to paragraph [0043] to further define the associative operation without adding new matter.

The associative operation claim 1 recites as being performed on the pixel values of each block, to determine properties of those blocks, as well as on the selected properties to determine the overall property of the region, is an operation that combines the pixel values or properties, such that when the order of these elements is preserved, the result is independent of their grouping. Naegle does not teach performing an associative operation on pixel values of each block to determine properties of each block. Further, Naegle does not teach performing an associative operation on the selected properties to determine the overall property of the region

Naegle discloses a computer graphics system utilizing a super-sampled sample buffer for refreshing a display (paragraph [0022]). The Examiner cited paragraphs [0076] and [0162] of Naegle as examples of Naegle anticipating the phrase "performing an associative operation on the pixel values" claimed in claim 1. Paragraph [0076] of Naegle teaches providing various "sample modes for pixels", such as taking multiple samples per pixel or taking a single sample per pixel. Also, paragraph [0162] of Naegle discloses rendering a sample using the samples color, alpha and other attributes. The paragraphs use the word "associated" in terms of information being associated with samples, pixels, bins, or vertices; however, this is a concept unrelated to performance of an associative operation. The use of the word "associated" in Naegle does not anticipate such "associative operations" as claimed. The Examiner places great value on the use of the word "associated"; however, the Examiner's characterization does not give the words "associative operation" their plain meaning as they would be interpreted by those of ordinary skill in the art. Words in patent claims are given their ordinary meaning in the usage of the field of the invention. In the field of digital image processing, and more specifically using windows to conduct analyses or operations on images, an "associative operation" is a mathematical operation and this term should be interpreted as such.

Claim 1 also recites providing a window defining a fixed size region of the image, the window having vertices and being configured such that a single vertex at most will be encompassed by any given block having portions within the fixed size region. Examiner points to paragraphs [0233] and [0235] in Naegle as support of Naegle teaching this limitation as claimed. These portions of Naegle describe graphics data which may comprise vertex data. However, the graphics data pointed to by the Examiner does not teach a window that is configured such that a single window vertex, at most, is encompassed by a given block. This graphics data does not teach a window having vertices. The Examiner has not pointed out what the window is, nor pointed to the window's vertices as taught by Naegle. The Examiner has also not explained how a single one of the window's vertices, at most, is encompassed by the block as claimed in claim 1. If the Examiner meant that the polygon information forms the window, Naegle teaches that the polygon information can define several objects, that is several polygons, each having a vertex in the block. There is no teaching in Naegle that not more than one of these vertices can be included in the block. If the Examiner meant that the graphics data sample can form the window, the vertices of the graphics data, that is the window's vertices, are not mentioned or taught. The Examiner has not provided prime facie support of Naegle teaching this claim limitation as claimed in claim 1. Applicant maintains that Naegle does not teach forming a window over blocks of the image with the limitations claimed in claim 1.

For these reasons, claim 1 patentably defines over Naegle and is therefore patentable. Further, claims 2-8 depending from claim 1 are also patentable.

3. Appellant's Arguments Re: Claim 2

Claim 2 is patentable over Naegle, since Naegle does not teach or suggest that performing the associative operation on the pixel values comprises determining maximums of the pixel values.

The Examiner cites paragraph [0185] of Naegle, as disclosing the maximum associative operation of the present application. The Applicants respectfully

disagree with this assertion. Naegle takes samples and filters them according to how close the sample is to the center of the rendered pixel. The samples closer to the pixel center are given a heavier weight than those samples further from the pixel center. This is not the same as performing a maximum associative operation on pixel values of a digital image for a fixed size region. Accordingly, claim 2 is patentable over Naegle.

4. Appellant's Arguments Re: Claim 3

Claim 3 is patentable over Naegle, since Naegle does not teach or suggest that performing the associative operation on the pixel values comprises determining minimums of the pixel values.

The Examiner cites paragraph [0185] of Naegle, as disclosing the minimum associative operation of the present application. The Applicants respectfully disagree with this assertion. As stated above, Naegle takes samples and filters them according to how close the sample is to the center of the rendered pixel. The samples closer to the pixel center are given a heavier weight than those samples further from the pixel center. This is not the same as performing a minimum associative operation on pixel values of a digital image for a fixed size region. Accordingly, claim 3 is patentable over Naegle.

5. Appellant's Arguments Re: Claim 9

Claim 9 is patentable over Naegle, since Naegle does not teach or suggest an apparatus for computing properties of an image represented by pixel values arranged in an array comprising means for performing an associative operation on the pixel values of each block to determine properties for the each block as claimed in claim 9. Further, Naegle does not teach or suggest means for performing an associative operation on the selected properties to determine the overall property of the region as claimed.

Claim 9 uses means-plus-function language to define the characteristics of the apparatus for computing properties of an image. In accordance with *In re*

Donaldson, 16 F.3d 1189, 1193 29USPQ2d 1845, 1848 (Fed. Cir. 1994) the Federal Circuit has made it clear that means-plus-function language should be interpreted according to 35 USC 112 sixth paragraph. The court held "The plain and unambiguous meaning of paragraph six is that one construing means-plus-function language in a claim must look to the specification and interpret that language in light of the corresponding structure, material, or acts described therein..." As stated above, the specification defines an associative operation in paragraphs [0001] and [0043] as including MINIMUM, MAXIMUM, AND and OR operations, which taken with the plain meaning provided by the dictionary meaning provided above defines the associative operation as a mathematical operation which combines elements such that when the order of elements is preserved the result is independent of the grouping.

Paragraphs [0076] and [0162] cited by the Examiner in Naegle use the word "associated" in terms of information being associated with samples, pixels, bins, or vertices; however, this is a concept unrelated to performance of an associative operation. The use of the word "associated" in Naegle does not anticipate such "associative operations" as claimed. Naegle does not teach or suggest using such an associative operation and thus claim 9 is patentable over Naegle.

Claim 9 also recites means for providing a window defining a fixed size region of the image, the window having vertices and being configured such that a single vertex at most will be encompassed by any given block having portions within the fixed size region. Examiner points to paragraphs [0233] and [0235] in Naegle as support of Naegle teaching this limitation as claimed. These portions of Naegle describe graphics data which may comprise vertex data. However, the graphics data pointed to by the Examiner does not teach means for providing a window that is configured such that a single window vertex, at most, is encompassed by a given block. This graphics data does not teach a window having vertices. The Examiner has not pointed out what the window is, nor pointed to the window's vertices as taught by Naegle. The Examiner has also not explained how a single one of the window's vertices is encompassed by the block as claimed in claim 9. For these

reasons, and those stated above, the Examiner has not provided prime facie support of Naegle teaching this claim limitation as claimed in claim 9. Applicant maintains that Naegle does not teach forming a window over blocks of the image with the limitations claimed in claim 9.

For these reasons, claim 9 patentably defines over Naegle and is therefore patentable. Further claims 10-17, depending from claim 9, are also patentable over Naegle.

6. Appellant's Arguments Re: Claim 18

Claim 18 is patentable over Naegle, since, for the reasons stated above, Naegle does not teach or suggest performing an associative operation on pixel values of each block to determine properties of each block, as claimed. Further, for the reasons stated above, Naegle does not teach or suggest performing an associative operation on the selected properties to determine the overall property of the region as claimed. Therefore, claim 18 is patentable over Naegle, and claims 19-21 depending therefrom are also patentable.

7. Appellant's Arguments Re: Claim 7

Claim 7 patentably defines over Naegle since Naegle does not teach or suggest providing an octagonal shaped window defining a fixed size region of the image. The Examiner states that the shape of the window is a matter of design choice; however, Applicant maintains that the Examiner has not explained how Naegle teaches providing a window defining a fixed size region of the image. The Examiner points to paragraphs [0233] and [0235] describing graphics data, however there is no mention of a window as claimed in claim 7. Further, there is no teaching or suggestion of a window having an octagonal shape. Accordingly, claim 7 is patentable over Naegle.

8. Appellant's Arguments Re: Claim 8

Claim 8 patentably defines over Naegle since Naegle does not teach or suggest providing a hexagonal shaped window defining a fixed size region of the image. The Examiner states that the shape of the window is a matter of design choice; however, Applicant maintains that the Examiner has not explained how Naegle teaches providing a window defining a fixed size region of the image. The Examiner points to paragraphs [0233] and [0235] describing graphics data, however there is no mention of a window as claimed in claim 8. Further, there is no teaching or suggestion of a window having a hexagonal shape. Accordingly, claim 8 is patentable over Naegle.

9. Appellant's Arguments Re: Claim 15

Claim 15 patentably defines over Naegle since Naegle does not teach or suggest means for providing an octagonal shaped window defining a fixed size region of the image. The Examiner states that the shape of the window is a matter of design choice; however, Applicant maintains that the Examiner has not explained how Naegle teaches means for providing a window defining a fixed size region of the image. The Examiner points to paragraphs [0233] and [0235] describing graphics data, however there is no mention of means for providing a window as claimed in claim 15. Further, there is no teaching or suggestion of means for providing a window having a hexagonal shape. Accordingly, claim 15 is patentable over Naegle.

10. Appellant's Arguments Re: Claim 16

Claim 16 patentably defines over Naegle since Naegle does not teach or suggest means for providing an octagonal shaped window defining a fixed size region of the image. The Examiner states that the shape of the window is a matter of design choice; however, Applicant maintains that the Examiner has not explained how Naegle teaches means for providing a window defining a fixed size region of the image. The Examiner points to paragraphs [0233] and [0235] describing graphics data, however there is no mention of means for providing a window as claimed in

claim 16. Further, there is no teaching or suggestion of means for providing a window having a hexagonal shape. Accordingly, claim 16 is patentable over Naegle.

CONCLUSION

In view of the foregoing, Appellant respectfully submits that claims 1-21 patentably define over Naegle.

Accordingly, it is respectfully requested that the Examiner's rejections be reversed.

Respectfully submitted,

FAY, SHARPE, FAGAN,
MINNICH & McKEE, LLP

Date: September 9, 2005

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IX. Appendix of Claims (37 C.F.R. §1.192(c(a))

1. A method for computing properties of an image represented by pixel values arranged in an array, a method comprising steps of:

scanning the array to determine the pixel values;

segmenting the array into blocks of the pixel values;

performing an associative operation on the pixel values of each block to determine properties of the each block;

storing the properties of the each block in a table;

providing a window defining a fixed size region of the image, the window having vertices and being configured such that a single vertex at most will be encompassed by any given block having portions within the fixed region;

determining which portions of which blocks are within the fixed size region;

selecting a property for each portion of each block within the fixed size region from the table based on the determining of which portions of which blocks are within the fixed size region and locations of the vertices of the window; and,

performing the associative operation on the selected properties to determine the overall property of the region.

2. The method as set forth in claim 1 wherein performing the associative operation on the pixel values comprises determining maximums of the pixel values.

3. The method as set forth in claim 1 wherein performing the associative operation on the pixel values comprises determining minimums of the pixel values.

4. The method as set forth in claim 1 wherein performing the associative operation on the selected properties comprises performing an operation to determine a maximum value for the fixed size region.

5. The method as set forth in claim 1 wherein performing the associative operation on the selected properties comprises performing an operation to determine a minimum value for the fixed size region.

6. The method as set forth in claim 1 wherein providing a window defining a fixed size region of the image comprises providing a window having a rectangular shape.

7. The method as set forth in claim 1 wherein providing a window defining a fixed size region of the image comprises providing a window of octagonal shape.

8. The method as set forth in claim 1 wherein providing a window defining a fixed size region of the image comprises providing a window of hexagonal shape.

9. An apparatus for computing properties of an image represented by pixel values arranged in an array, the apparatus comprising:

means for scanning the array to determine the pixel values;

means for segmenting the array into blocks of the pixel values;

means for performing an associative operation on the pixel values of each block to determine properties for the each block;

means for storing the properties of the each block;

means for defining a fixed size region of the image;

means for determining which portions of which blocks are within the fixed size region;

means for selecting a property for each portion of each block within the fixed size region from the storing means; and,

means for performing the associative operation on the selected properties to determine an overall property for the fixed size region.

10. The apparatus set forth in claim 9 wherein the associative operation comprises determining a MINIMUM of the pixel values.

11. The apparatus set forth in claim 9 wherein the associative operation comprises determining a MAXIMUM of the pixel values.

12. The apparatus set forth in claim 9 wherein the properties of the block comprise minimums of the pixel values.

13. The apparatus set forth in claim 9 wherein the properties of the block comprise maximums of the pixel values.

14. The apparatus set forth in claim 9 wherein the defining means comprises a window having a rectangular shape.

15. The apparatus set forth in claim 9 wherein the defining means comprises a window of octagonal shape.

16. The apparatus set forth in claim 9 wherein the defining means comprises a window of hexagonal shape.

17. The apparatus set forth in claim 9 wherein the defining means comprises a window, the window having vertices and being configured such that a single vertex at most will be encompassed by any given block having portions within the fixed size region.

18. A method for computing a property of a complex window for use in image analysis, the method comprising steps of:

dividing the complex window into regions;

computing the property for each region to obtain a partial result by conducting an associative operation; and,

determining the property for the complex window based on partial results of the regions by conducting the associative operation on the partial results.

19. The method set forth in claim 18 wherein the property is a minimum value.

20. The method set forth in claim 18 wherein the property is a minimum value.

21. The method set forth in claim 18 wherein the complex window is an annulus.

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